

ABSTRACT

The present invention generally provides improved adhesion and oxidation resistance of carbon-containing layers without the need for an additional deposited layer. In one aspect, the invention treats an exposed surface of carbon-containing material, such as silicon carbide, with an inert gas plasma, such as a helium (He), argon (Ar), or other inert gas plasma, or an oxygen-containing plasma such as a nitrous oxide (N₂O) plasma. Other carbon-containing materials can include organic polymeric materials, amorphous carbon, amorphous fluorocarbon, carbon containing oxides, and other carbon-containing materials. The plasma treatment is preferably performed *in situ* following the deposition of the layer to be treated. Preferably, the processing chamber in which *in situ* deposition and plasma treatment occurs is configured to deliver the same or similar precursors for the carbon-containing layer(s). However, the layer(s) can be deposited with different precursors. The invention also provides processing regimes that generate the treatment plasma and systems which use the treatment plasma. The carbon-containing material can be used in a variety of layers, such as barrier layers, etch stops, ARCs, passivation layers, and dielectric layers.

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